

HUNTERIAN ORATION.

R.C.S.C.

CENTENARY CELEBRATION

1893

THOMAS BRYANT.

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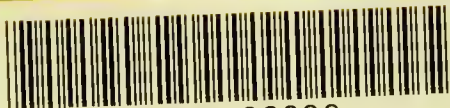
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HUNTERIAN ORATION.



THE
HUNTERIAN ORATION

DELIVERED IN THE PRESENCE OF

THEIR ROYAL HIGHNESSES THE PRINCE OF WALES
AND DUKE OF YORK

AT THE

Royal College of Surgeons of England

ON THE

CENTENARY OF HUNTER'S DEATH.

FEBRUARY 14TH, 1893.

BY

THOMAS BRYANT, F.R.C.S.E. & I., M.CH.,
PRESIDENT OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND;
CONSULTING SURGEON TO GUY'S HOSPITAL.

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THE
HUNTERIAN ORATION.

MAY IT PLEASE YOUR ROYAL HIGHNESSES,
MR. VICE-PRESIDENT,
MY LORDS AND GENTLEMEN,

I feel sure that I am but expressing the general sentiment of the representative body of Surgeons here assembled, when, in their names and in that of the College over which it is my privilege to preside, I offer to Your Royal Highnesses our respectful thanks for your presence here to-day.

We venture to accept your presence on such an occasion as the celebration of the Centenary of the death of the great founder of Scientific Surgery, as an indication of your approval of the work of this College as a public institution, and as a promoter of the Scientific Surgery that John Hunter established. We would assure Your Royal Highnesses that your visit will not only be gratefully remembered, but prove to be a powerful incentive to our

continued good work, as the national custodians of the Hunterian Museum, guardians of Hunter's reputation, and promoters of the Art and Science of Surgery.

ONE hundred and sixty-five years ago a careful observer might have read in one of the papers of the period, the announcement, that on February 14th, 1728, the wife of John Hunter, of Long-Calderwood, in the parish of East Kilbride, East Lanarkshire, about eight miles from Glasgow, gave birth to a son. This son being her tenth child by a husband aged 64 years.

Sixty-five years later, that is in 1793, or one hundred years ago, another observer would have read in 'The Oracle' of October 18th an intimation of the death of this son—who had been named John after his father—in the following terms:—"This eminent surgeon and valuable man was suddenly taken ill on Wednesday (October 16th) in the Council room of St. George's Hospital.

"After receiving the assistance which could be afforded by two physicians and a surgeon he was removed in a Sedan chair to his own house in Leicester Square, where he expired about two o'clock, in his sixty-sixth year." *

"The profession has lost in him one of its principal pillars and brightest ornaments; and mankind may lament in him one of their best benefactors. The

* This account is not correct. Hunter died at St. George's Hospital.

ardour and success with which he cultivated natural knowledge and philosophy, and rendered them subservient to his profession, had deservedly raised him to the first name. The monument of industry and genius which he has left behind will best speak his praise and call for the gratitude of this and future ages."

These two announcements intimated to the world the beginning and ending of the life of a man who has become one of the most brilliant of the fixed stars of our national genius; and he became so, not so much by his contributions to the stock of human knowledge, which in themselves were colossal, as by his opening up a line of investigation which was entirely original, and by his marking out in the clearest way the paths which all future investigators must tread, who desire to decipher the problems of life, disease, and death.

During this century "Great men have been among us, hands that penned, and tongues that uttered wisdom," but to-day we celebrate the death of the greatest; and I would that I had the wisdom of a Bacon and the eloquence of a Burke to do justice to his memory.

As a humble disciple, however, of John Hunter, and in the presence of his followers, many of whom have, in adding lustre to his reputation acquired much for their own, I propose to display before you, some of the leading conclusions of his life; and by trying to understand his methods and modes of

work, learn how we can help ourselves and those who may follow us to maintain, extend, and develop what will endure for all time—the school which Hunter originated, and to which every good surgeon since his age has unquestionably belonged; for the *Hunterian era of Surgery*, which is rightly marked by Dr. Billings, of Washington, as the starting-point of Modern Surgery, is now established, and it is but right that we, its professors, should do our best not only to encourage the study of Hunter's works, which have a power of awakening thought and stimulating industry of a unique character, but to provoke those who shall come after us to the imitation of whatever there was of good report, noble, or lovely in Hunter's life, as well as in the lives of those who since our last oration have

“Doffed this garb of frail mortality.”

Dante.

And here I would introduce the names of some distinguished Fellows of our College, with the dates of their death, who have “fallen asleep” since our last oration.

Sir Prescott Hewett who died, æt. 79, on June 19th, 1891.

John Wood, æt. 66, on December 19th, 1891.

Berkeley Hill, æt. 58, on January 7th, 1892.

Sir William Bowman, æt. 76, on March 29th, 1892.

Charles Hawkins, æt. 80, on April 4th, 1892.

F. Le Gros Clark, æt. 82, on July 19th, 1892.

Edward Cock, æt. 87, on August 1st, 1892.

Samuel A. Lane, æt. 90, on August 2nd, 1892.

Alfred Baker, æt. 78, January 12th, 1893.

All good Hunterian surgeons who made for themselves names which will long be remembered by the members of the profession they adorned, and many of whom held high office in this College; and last, but not least, I must mention the name of our oldest Fellow, that great anatomist, biologist, and natural historian, Hunter's greatest expositor, Sir Richard Owen, who died on December 18th, aged eighty-seven, and by his long and well-spent life not only left natural science greatly his debtor, but by his genius and industry attracted to the museum of this College the attention both of the scientific and lay world, and helped in a measure which is difficult to calculate during the twenty-eight years of labour he devoted to our Hunterian Collection as Clift's assistant, and our conservator and professor, to place it in the proud position in which it now stands. May this College never forget these signal services, or fail to do honour to the memory of this great man.

I have no intention of entering into the particulars of Hunter's early life; but brought up as he was by a loving mother, and guided by a father "who maintained to the very end of his life (1742)—that is to his son John's fourteenth year—a clear and sound judgment, as well as the tenderest and wisest interest in the welfare of his children,"

(Simmon's letter), there is no reason to think that John, more than any of his children, was left uncared for, but every reason to believe it probable, with Luther Holden, our eloquent orator for 1881, "that John was educated at the same school as his brothers, William and James, and that he was brought under the influence of an equally good moral training."

That he spent much of his time in country amusements and country pursuits is more than probable, but that he did so as an idler is beyond belief, for on his own authority we have it stated that when "I was a boy I wanted to know about the clouds and the grasses, and why the leaves changed colour in the autumn; I watched the ants, bees, birds, tadpoles, and caddis worms. I pestered people with questions about what nobody knew, or cared anything about;" and can we, with our full knowledge of the man and of what he subsequently achieved, say that the education he has himself described so tersely and so well was not for him the very best he could have had? For as the child is father of the man, is it not as clear as daylight that all his senses had been educated to the highest degree, and that not one had been allowed to slumber; whilst his reasoning powers had been brought to bear upon problems of the highest interest, concerning things above, upon, and beneath the earth; and in what better way could they have been employed?

It was not, however, till he came to London at the age of twenty that his "natural fitness for the study of living things" had full scope in the dissecting room and museum of his highly-distinguished brother William. For it was there that new worlds of wonder were opened to him in human and comparative anatomy; and it was there likewise that he used his opportunities of questioning nature so well, as not only to open up fresh avenues of knowledge, but to demonstrate the necessity of making comparative anatomy and physiology preliminary studies to that of life as well as of disease; pathology following in the line of physiology.

Hunter's physiology, moreover, was of no narrow type, but of the broadest and deepest character; indeed it included "the whole science of the normal life of all things that live or have lived" in both the vegetable and animal kingdoms; and his comparative anatomy was no less inclusive, for it took in the comparative structure of all living things with the uses and functions of their different parts. While he unveiled many of the secret operations of nature, his material was so arranged as to illustrate the workings of every vital process as displayed in each organ, and traced through every gradation of being, from the lowest to the highest; or to quote from our second conservator, the late Sir Richard Owen, "his labour not only established a body of physiological doctrines, to the happy influence of which every cultivator of the healing

science now bears grateful testimony, but they deserve to be viewed in the light of a first attempt to arrange in one concatenated system the diversified facts in comparative anatomy ;” comparative anatomy in Hunter’s time being a new science.

If we ask ourselves what it was which helped to make Hunter great, we must, as an encouragement to weak humanity, refer to his industry ; for John Hunter was industrious in the highest degree and possessed a transcendent capacity of taking trouble. Without this attribute it is probable that his other great qualities would have failed to have made him famous, and they certainly would have never enabled him to leave the unique collection of biological facts behind him, such as is contained in the museum it is our pride as Englishmen and our privilege as British surgeons to possess. I emphasise this quality of industry, as it can never be too strongly or frequently repeated, that industry and the capacity of taking trouble are essential qualities for success in every calling or walk in life, and that without them all intellectual qualities, however noble, are apt to be frittered away and rendered futile. The pages of history record the wreck of many men of high promise and intellectual ability who have failed to shed a lustre upon their period for want of this essential qualification.

As an additional testimony to Hunter’s industry let me quote from a lecture of our late curator—a

successor of Sir Richard Owen—now so worthily known as Sir W. Flower, in which he said “that Hunter had collected materials for a work which needed but the finishing touches to have made it one of the greatest, most durable, and valuable contributions ever made by one man to the advancement of the science of comparative anatomy” (Introductory Lecture to Course at College, February 14th, 1870).

So that on the authority of the late Sir Richard Owen we have it stated that Hunter made the first attempt to establish a new science, that of comparative anatomy; and on the authority of Sir W. Flower we are told that the success of the attempt was in itself complete.

As an observer John Hunter stands pre-eminent, and as an indefatigable student of Nature he was supreme; nothing escaped his attention, and what he observed he verified so carefully and thought over so intently, that he saw more accurately, deeply, widely, and sagaciously than anyone else. In all his works Hunter followed the Baconian method, and yet we have no evidence that he knew anything of Bacon’s work, or of the inductive mode of reasoning which he introduced. Hunter, apparently out of the depth of his own nature, unconsciously travelled along the Baconian road.

From boyhood, as he himself has told us, he had observed and interrogated nature in many of her

works, and as a result of his observations, high problems had been suggested. He wanted even then to know many things which still seem unknowable. This want indeed never left him, and to supply it, he, as life went on, diligently sought for every fact his senses could discover in the different lines of investigation he followed, and, what is more, described the facts he found with an accuracy which is absolute; where he was uncertain of his facts he looked again, and to test a doubtful one he experimented. He always doubted what he could not prove. Hunter observed to find facts, and experimented to make and to prove them. The absolute necessity of *accuracy of observation* was so fully recognised by Hunter that he trusted nothing to memory, but wrote down what he saw at once; for, using his own words, he felt that “men should be very accurate in ascertaining the truth of facts before they advance them, especially when they tend to overturn a received *opinion*, or to *establish* a new one.”

If Hunter was great from his industry and as an observer, he was still greater as a *thinker and reasoner*. Facts alone could not satisfy his mind. He, of necessity, speculated upon their value, and reasoned upon them with a closeness and far-seeing intelligence which was surprising. He seemed, as by intuition, to recognise at once the full value of any fact, and to be able to place it in its right posi-

tion in relation to all knowledge; as a consequence, he was able, from the accumulation of the material which his observation and experience had yielded, to elicit the principles upon which they were founded, and the processes by which they were brought about. Much as Hunter did, said his friend Cline in this theatre in 1816, "he thought more. He has often told me his delight was to think."

"The facility with which a man thinks," said Hunter himself, "gives him a superiority over others; few," he added, "have observed nature with more attention than myself, yet, even now, I think myself scarcely equal to the task I am undertaking—the elucidation of the economy of human life."

Again, in the year 1768, "I—wrote Hunter—was called upon to be a teacher of anatomy, but I congratulate myself that I did not become so, as it could not have failed of engaging my attention too much, to admit that general attention I have been able to pay to surgery; and the necessity I should have been under to read might have occupied me too much, and *prevented my forming habits of established modes of thinking.*"

Again, "what more than all induced me to lecture was the great advantage everyone finds by putting his thoughts into writing. A man can never tell how much he knows till he arranges his knowledge, and then he can tell how defective it is."

It must therefore be accepted that deep thinking

was one of Hunter's characteristics ; and I can give you no better evidence of this than that quoted by Abernethy, on the authority of Clift, " that Hunter would stand *for hours* motionless as a statue, except that with a pair of forceps in either hand he was picking asunder the connecting fibres of some structure he was studying ;" and this was written of him in the year of his death.

What a picture is here presented to our minds of Hunter as an inductive thinker ! The new fact displayed to view after infinite trouble. The dissector patiently reasoning out its meaning, standing for hours, in the words of an eloquent friend, before me, " patient and watchful as a prophet, as if he were sure that the truth would come—in the clearing of some mental cloud, or as in a sudden flash, with which, as in an inspiration the intellectual darkness became light" (Paget, Oration, 1877). The picture is complete. It should be painted by another Reynolds.

But Hunter was more than a thinker and reasoner on facts, although, as a man of science, he contemplated nature with his understanding, and, as a lover of truth, he kept to his facts ; for he possessed to an equally high degree imagination and an intellectual foresight, with that higher degree of intellectual power which enables a man to recognise a truth directly it is enunciated ; to perceive self-evident facts, and through them to read the laws and fundamental principles by which nature works.

He obtained his ideas as much through the reason by reflection as through the senses. In the speaking portrait above me this mental characteristic of John Hunter is displayed in a manner which genius alone could have depicted ; for the thinker is clearly looking upwards as if he had heard "whisperings from the Infinite," and at the moment when one of the laws by which nature works had suddenly dawned upon him. He is manifestly looking beyond the mists which surrounded the wonderful world of life he had so long been investigating, and many of the mysteries of which it had been his privilege to unveil. Indeed, Hunter's intellectual faculties had been so highly educated, and were of so high an order, that he was able to read the unknown truth in the known fact ; and by observation and thought to work out principles and general truths which have thrown a flood of light for ever, not only upon all past, but upon future knowledge. And what is more, his work has been so suggestive, that while we, his successors, adopt his thoughts, we profit by the thoughts that his suggest.

In all Hunter's work fact and theory were indissolubly bound together ; and as a proof that his theories were good, every fresh fact he discovered found its place in them.

My mind "is like a beehive," said Hunter to Abernethy, one of Hunter's friends and earliest and most enthusiastic expositors, and "the simile struck me, wrote Abernethy, on account of its

correctness ; for in the midst of buzz and apparent confusion there was great order, regularity of structure, and abundant food, collected with incessant industry from the choicest stores of knowledge."

Hunter apparently, had no idea of his own great intellectual powers. Abernethy records he had heard Hunter say, "I know I am but a pigmy in knowledge," and declare that he was not conscious of possessing any peculiar talent ; and that if he had promoted professional knowledge, it seemed to him chiefly to have arisen from his disposition to distrust opinions and to examine every subject for himself. But it may be fairly asked, Was not this state of Hunter's mind due to the fact that his knowledge was so great that he knew his littleness ? I rather incline to this latter view.

Hunter was a *nervous man* and much disliked speaking in public. He never gave his first lecture, wrote Sir E. Home, without taking thirty drops of laudanum to take off the effects of his uneasiness.

He lectured always from notes which he read ; and from comparing different copies of his lectures, I am sure that he divided his subjects up into aphorismal paragraphs, which he subsequently enlarged upon and illustrated by cases. He also revised and corrected his great work on the blood, inflammation, and gunshot wounds for twenty years before he prepared it for the press, and he then died before it was published.

Hunter did this because he was always unwilling to publish anything which appeared to himself unfinished; for the same reason he would often withdraw papers read before the learned societies, because he felt they wanted something more to make them satisfactory.

With Hunter this cautiousness was something of a misfortune; for his great work on inflammation and gunshot wounds, upon which so much of his professional reputation has been built, was not published till after his death, and had it not been for his public lectures in the school of St. George's Hospital and at 28, The Haymarket, his advanced views of pathology and surgery would during his lifetime have been little known. It is probably on this account that Hunter was insufficiently appreciated. His teaching was known but to a few.

It is interesting to speculate as to what would have been the effect of this cautiousness in publishing, if it had been as rigidly observed by Hunter's followers as it was by Hunter. Should we have been great losers by its adoption, and would individuals have been great gainers? Could we now with any truth agree with Hunter when he wrote, "That it is surprising to see how a young man, if he catches an idea which has any novelty, will write away on it—he will tell you wonders;" and can we say, if the tillers of the field of science are now more numerous than they were in Hunter's day,

that they are so eager to reap the fruit of their labour as to bring it to market before it is ripe?

Extreme cautiousness, and a dread lest he might have been led to publish any new thought before it was absolutely proved, was evidently one of Hunter's characteristics; and, as a further proof of this, it should be added that Hunter always regarded any opinion or conclusion he formed as provisional, for he felt that one new fact or observation might lead him to change it. He would say to students he was teaching, "You had better not write down that observation, for very likely I shall think differently next year."

As an *experimenter*, Hunter was a king, and a model one. He never made an experiment without a definite object, either to illustrate an idea, prove a fact, clear up a doubt, or enable him to grasp a truth which he could not prove; and although he made every investigation that he could the subject of experiments, each one was preceded by deep reflection.

In one place he said "that it was not justifiable to draw conclusions from a single experiment." In another, "I think it may be set down as an axiom that experiments should not be often repeated which merely tend to establish a principle already known and admitted, but that the next step should be the application of that principle to useful purposes;" and later on he wrote, "we can have no very high

idea of experiments made by men who, for want of anatomical knowledge, have not been able to pursue their reasoning beyond the simple experiment itself."

"It happens, unfortunately," he added, "that those who, from the nature of their education, are best qualified to investigate the intricacies and improve their knowledge of the animal economy, are compelled to get their living by the practice of a profession which is constant employment."

To his friend Jenner, who had given only a conjectural solution of a phenomenon, he wrote, "I think your solution is just, but why think? Why not try the experiment? Repeat all the experiments as soon as you receive this, and they will give you the answer."

"Fontana's experiments," he wrote, "for injecting solutions into the blood are not worth a pin, and that owing to his not having a knowledge of this fact, that air thrown into the vessels kills; after I discovered this I went over all my experiments again, and found very different results when I injected no air, which before that had been frequently inserted."

And now I must give one further quotation from Hunter as to the general outcome of experiments. "In pursuing any subject most things come to light as it were by accident, that is, many things arise out of investigation that were not at first conceived, and even misfortunes in experiments have brought things to our knowledge that were not, and

probably could not, have been previously conceived. On the other hand, I have often devised experiments by the fireside or in my carriage, and have also conceived the result; but when I tried the experiment the result was different, or I found that the experiment could not be attended with all the circumstances that were suggested."

These views of Hunter upon experiments cannot be otherwise than valuable. They are characterised by absolute honesty of purpose and breadth of knowledge.

Last, but not least, Hunter *worked for fame* and not for profit. What he made in his profession he spent on his museum; and when he was interrupted in his scientific pursuits to earn a fee, he went because he knew he would want the fee to-morrow to supply his needs. He never went from choice, for his inclination would have held him closely to his work.

He was also an enthusiast in all he did, and he therefore worked with a will. And can we wonder at his being so? for at every step in his investigations fresh natural beauties were being revealed; and at every resting-place, with his luminous mind, these fresh beauties suggested the laws and principles on which they rested.

And if, in us, the mere reading of his works produces an intellectual pleasure of a stimulating and awakening nature, with what an intense thrill of

satisfaction must the first vivid conception of those secrets of the laws of nature have been attended in his frame, and with what natural reluctance would he have left his dissecting table !

I have thus, then, so far in this lecture been considering Hunter as a worker, for it has been my privilege and pleasure to place before you the main mental characteristics of as vigorous and original a human being as mankind has ever seen ; of one who came into the world with little promise, and some say with less advantages than most ; but whose faculties budded out so rapidly under favourable conditions as to enable their possessor to remodel the fabric of knowledge and revolutionise our modes of thought, as well as to bring forth leaves, flowers, and fruit for his own generation to wonder at, and for all future generations to enjoy and feed upon ; for the flowers and fruit of Hunter's genius are everlasting.

I might add that Hunter was said by Sir E. Home to have been of a short stature. By Dr. Adams he was described as being much below the middle stature. By Mr. Clift he was said to have been five feet two inches, and Clift must have been right. He was uncommonly strong and active, very compactly made, and capable of great bodily exertion. His countenance was animated, and in the latter part of his life deeply impressed with thoughtfulness ; and this we can well understand, if we attempt to understand such a man at all, and if

the information we have of his thoughts and doings is correct.

In the sketch of Hunter's character and mental characteristics which I have ventured to place before you, I have taken the liberty of illustrating Hunter by Hunter, for I felt that so remarkable a man could be best interpreted by himself, and I have thus quoted his own words where they could be found rather than the opinions of others, and his own acts as they have been recorded in his works. Judicially, therefore, we must pronounce the verdict that John Hunter as a man had individual and intellectual qualities which have never been surpassed, if ever equalled, and if he had imperfections we will not look for them, for he was human, and no shortcomings could dim the lustre of his splendid genius.

PART II.

HUNTER AS A BIOLOGIST.

I will now pass on to consider what Hunter did, and I fear that here failure must follow the attempt, for in re-reading all his works and the works of his commentators, I feel almost lost in wonder at the magnitude and variety of his undertakings and of his performances; for the whole world of vegetable and animal life was his subject; and the workings

of everything possessing life the objects of his scrutiny. If form and structure were his chief early studies, function and purpose always occupied a large part of his attention, and these he regarded as much in a state of health as under the influence of disease; as much in their abnormal as in their normal relations. "Vital operations were," he said, "always his favourite business and amusement."

Yet the study of all these subjects was only a means to an end, and was subordinate to the main object of his life, namely, the improvement of surgery by the elucidation of pathology (the science which investigates the laws of disease), the causes which determine any departure from the normal type, whether of form or function, and the means which nature adopts for the healing of wounds and the repair of injuries.

It was in order to understand these processes, and to search out the laws by which they were governed, that Hunter recognised the necessity of first investigating the structure of the living body, with the functions of every organ in a state of health; for he held that physiology was as essential to explain pathology as it was to explain the healthy actions of every day life. But he saw further, for, in order to understand in man the structure of his organs and their function, he realised the wisdom of first examining the structure and vital processes of identical organs throughout the whole animal kingdom from its lower up to its higher grades.

He appreciated to the full the force of Bacon's dictum, "That no natural phenomenon can be adequately studied in itself alone, but to be understood must be considered as it stands connected with all nature;" or to use Hunter's own words, "Nothing in nature stands alone; every art and science has a relation to some other art or science, and it requires a knowledge of these others, as far as this connection takes place, to enable us to become perfect in that which engages our particular attention."

If we look to Hunter's biological researches and review his conclusions, we find them very clear.

He first took life as a subject, and came to the conclusion that, although "the man, the oak, and the mountain are but different modifications of the same elementary matter," that "mere composition of matter does not give life, for the dead body has all the composition it ever had." "That life never can arise out of, or depend on, organisation, but that organisation arises from and depends on life, and is the condition of vital action." "Life is a power superadded to matter, and is a property we do not understand; we can only see the necessary steps to it."

"A seed put into a moist ground grows, but the moist ground is only a necessary attendant and not the immediate cause. The life of the seed stimulated to action by the moisture is the immediate cause of its growth. All the water in the world would not make a dead seed grow."

“The same power that exists in the seed is in the egg.”

“The *first* and most simple idea of life is its being the principle of *self-preservation*, preventing matter from falling into dissolution; for dissolution immediately takes place when matter is deprived of life. The *second* idea of life is its being the principle cause of all action.”

“No part of the body is to be considered as a complete living substance producing and continuing mere life without the blood; so *that* makes one part of the compound without which life would neither begin nor be continued.”

“Every individual particle of animal matter is possessed of life, and the least imaginable part which we can separate is as much alive as the whole.”

“Blood is not only alive itself, but is the support of life in every part of the body.”

“This living principle in the blood is in its effects similar to the living principle in the solids; it owes its existence to the same matter which belongs to the other, and is the *materia vitæ diffusa* of which every part of an animal has its portion; it is, as it were, diffused through the whole solids and fluids, making a necessary constituent part of them, and forming with them a perfect whole.”

“The *materia vitæ* keeps up the harmony between the blood and the solids.”

“Mere organisation can do nothing; even in

mechanics it must still have something corresponding to a living principle: namely, some power."

Hunter recognised that the chemistry of the laboratory and of inorganic bodies dealt with the same elementary substances as those of life; but he likewise recognised that the combinations of these same elements in the inorganic world differed widely from those worked up in the majesty of silence in the life department of nature's works.

Hunter proved that the life of the flesh was in the blood. And it is interesting to note how, in all his investigations into the methods which nature adopts for preserving life, he had always before him the still unsolved problem which lies behind, as to how and where the food that man takes to maintain life becomes alive; becomes, as he expressed it, animalised and vivified, for, as he said, "from living matter only living parts can be made."

He was always asking himself such questions as: Does life begin after digestion in the chyle? Is the chyle alive before or after it mixes with the blood? What are the effects of respiration on the life of the blood? Indeed, I do not think that I shall be far wrong when I state my belief that it was to Hunter's attempt to solve these and allied problems that we are indebted for the museum, in the centre of which we now stand, and for the great physiological principles bearing upon the economy of life for which all biologists and pathologists must be for ever grateful.

But Hunter was not content to trace life only in animals that move, he searched further, for "I had long suspected," he wrote, "that the principle of life was not wholly confined to animals, or animal substance endowed with visible organisation and spontaneous motion; but supposed that the same principle might exist in animal substances, devoid of apparent organisation and motion when the power of preservation was simply required." "I was led to this opinion," he added, "in 1757, about twenty years ago, when busied in making drawings of the growth of the chick in the process of incubation. I then observed, that when an egg was hatched, the yolk (which is not diminished in the time of incubation) was always perfectly sweet to the very last, and that the part of the albumen which had not been expended on the growth of the animal some days before hatching was also perfectly sweet, although both were kept at a heat of 103° in the hen's egg for three weeks, and in the duck's egg for four; but I observed that if an egg was not hatched, that egg became putrid in nearly the same time with any other dead animal matter." This experiment suggested that eggs possessed a living principle.

To determine from other tests how far this suggestion was true, Hunter made the following experiment:—"After having placed an egg in a cold mixture about zero till it froze, he allowed it to thaw; by which process it was to be supposed the

preserving powers of the egg must be destroyed. He then put this egg back into the cold mixture, and with *it one newly laid*, and found the difference in freezing was seven minutes and a half, the fresh one so much longer time resisting the powers of cold."

"Again, a fresh egg, and one that had been frozen and thawed, was put into a cold mixture at 15° . The thawed one soon came to 32° , and began to swell and congeal; the fresh one sunk to $29\frac{1}{2}^{\circ}$, and *in twenty-five minutes later than the dead one* it rose to 32° , and began to swell and freeze."

From these experiments Hunter concluded that a fresh egg has the power of resisting heat, cold, and putrefaction in a degree equal to many of the more imperfect animals; and it is more than probable this power arises from the same principle in both—"the Principle of Life."

These experiments appear to me so simple and interesting, that I have been induced to bring them under your notice, for I question whether before or since eggs have been used for a more lofty purpose, and I think the conclusions which Hunter drew from his experiment are to be accepted. They tend, however, to support another principle which was dear to the mind of Hunter, and which should ever be before us as practical surgeons, and that is "The Antiseptic Power of Life." Hunter, however, went even beyond this, for he believed that "no changes wrought in animal and vegetable bodies can possibly arise from fermentation; for the pre-

sence of life resists fermentation, and no body, whilst retaining its life, can possibly be acted upon by fermentation—which can only take place after the destruction of life, which is the preserving principle.”

Again, Hunter demonstrated the truth that organised creation had been formed on a *single plan or type*, which may be traced throughout the whole animal world; and that the lower animals represent permanently the successive stages through which higher animals pass until they have attained their full and perfect development.

Thus Hunter reduced organisation to one type, as he had reduced life to a single principle.

But Hunter saw further, for it seems fair from his writings to infer his belief, that in the gradual evolution of this type through the animal creation, the idea which controlled the developmental force throughout its innumerable stages must have been pre-existent; since the idea, by virtue of which the thing made has its form, function, and life, must have existed before it was revealed in its material form. He saw, with Cuvier, that the animals and plants of all periods are but different emanations from the same great thought.

Hunter, however, did even more than this, for he laid it down as a law that “every deviation from that original form and structure which gives the distinguishing character to the productions of nature, may not improperly be called *monstrous*. According to this acceptance of the term, the

variety of monsters will be almost infinite, and as far as my knowledge has extended," said Hunter, "there is not a species of animals, nay, there is not a single part of an animal body which is not subject to an extraordinary formation. Neither does this appear a matter of chance; for it may be observed that every species has its disposition to deviate from nature in a manner peculiar to itself—each part of each species seems to have its monstrous form originally impressed upon it."

And, lastly, Hunter formed the superb conception, "That in nature nothing is irregular, nothing is perturbed, nothing is disobedient, and everything is really regular, uniform, and obedient to recognised principles. With him the science of pathology did not mean the laws of disease in man alone, or even in the whole organic kingdom; but it meant the laws of disease and malformation in the entire material world, organic and inorganic." (Buckle, vol. ii, p. 567.)

These are only a few of the "treasures from the cells of human thought" which John Hunter reduced from his careful exposition of biological facts, and patient and deep thought upon their meaning. They are grand conclusions even now, if we regard them in the light of our present advanced knowledge; but they become grander when we recall the fact that biology and comparative anatomy in Hunter's day were unknown sciences and branches of knowledge for which there was no taste. Indeed, I have

out of Hunter's own mouth already recorded how that he had as a boy pestered people with questions on natural history subjects about which nobody knew or cared anything, and it is very probable that as a man he might have said nearly the same thing.

It is true that the discoveries of William Harvey, which were made known in 1620, had not only dispersed for ever the mists of vague speculation which had so grievously hung around the great central point of physiology—"the circulation of the blood," but by the illuminating influence of his work had thrown a light upon many other dark spots of knowledge, which ought to have and might have enabled some of those who followed Harvey to read the lessons in his spirit. But strange to say, no such disciple appeared, and it was left for our own John Hunter, upward of a century and a half later in time, to follow in the track which Harvey had prepared, and to light a lamp which illuminated every branch of natural history and biology; which has helped succeeding generations to reach our present proud position of increasing knowledge; and which will continue to burn as an illuminating force so long as the human intellect is capable of employment.

PART III.

HUNTER AS A SURGEON.

Time tells me, however, by Hunter's own clock, which still keeps good time (clock on table), that I must hurry on, for I want, before I conclude, briefly to place before you the claims of John Hunter as a surgeon, as a physician, as a contributor to medical science considered as a whole, for to his mind, what we now call medicine and surgery were inseparable, since both branches of knowledge are governed by identical laws; and the pathology of one branch is the pathology of the other.

But first of all, let me assert the fact, and mention it as one of Hunter's special merits for which our profession will to him for ever be indebted; that he raised it out of the position of a poor art, based on empirical knowledge and practiced too much as a trade, to establish it firmly as a high and elevating science, at the same time raising its practitioners in the social scale; and in saying this I would have it known that Hunter did as much for medicine as for surgery, and that the physician may claim him as much as the surgeon as his own.

He made our profession scientific by basing it upon the widest knowledge of the structure and functions of all living things; and by so systema-

tising the facts which had been gathered by past experience and his own unwearied industry as to educe from them, by his searching and luminous intellect, laws and principles for the guidance of future generations in their study and treatment of disease in any of its forms.

If Hunter had come into this world for no other purpose than this, he would not have lived in vain ; he would have been worthy of the thanks of civilised mankind.

In Hunter's teaching, therefore, little else is to be found than the application of the great principles of our science to the treatment of disease and injury.

"The principles of disease," said Hunter, "which become the object of surgery have not been sufficiently attended to, and these are what I shall chiefly consider."

As soon, therefore, as Hunter proceeds to consider "the disturbances which Nature works and of her cures," he lays down the great physiological principle of *natural repair*, and states in pithy language, "That all parts are capable of being restored in their kind."

"When loss of substance happens in any part, and that loss is to be restored, the parts which restore the loss, or which regenerate the substance, for that purpose preserve the same disposition with which they were at first formed, the original disposition being ready to act when called upon."

The process of restoration in Hunter's mind being

similar to that of formation, it is, therefore, to be regarded as a natural process, for, adds Hunter, “a sore that is going through all its natural stages to a cure cannot be called a disease.”

The different processes of natural physiological repair occupied much of Hunter's attention, and his investigations into the nature of the blood, its life, and its influence on the nourishment of the system and on repair, are not the least interesting portions of his work. But in this assembly of Hunterian disciples, and in these days when Hunter's views are insisted upon by most surgeons, there is no necessity to dwell upon them at any length; indeed, had they not been too much mixed up by Hunter with the pathological subject of inflammation, I should probably have passed them by with a brief notice. But I want on the present occasion to emphasise a fact which Hunter himself recognised, but did not make sufficiently clear, *that repair in all its forms is effected without inflammation.*

That Hunter saw this and more cannot be disputed, for I shall be able to demonstrate the truth of the assertion out of his own words, and also be able to show that he entertained the opinion that in a case of injury where inflammation takes place, repair is interfered with, if not arrested. Why Hunter in his writings failed to make these views sufficiently clear was doubtless owing to his want of knowledge as to the true causes of inflammation, and I trust I may be pardoned if I assume that had

he known what we now know of the effects of micro-organisms upon wounds and in the blood-current, he would have readily accepted the views which we now accept, that inflammation is an infective process brought about entirely by micro-organisms introduced from without, and that, instead of helping, it either retards or arrests repair. Under these circumstances Hunter would have been ready to adopt the view which must ere long be generally accepted and consequently taught :

That repair and inflammation are not only not identical, but incompatible.

That repair is a *constructive* physiological process, and resembles closely that of development and growth.

That inflammation is a *destructive* pathological process, and is entirely due to the presence of micro-organisms introduced from without.

That when inflammation attacks a wound in the process of repair, it at first checks repair and later on brings about disorganising changes ; and when a part repairs after it has been the seat of inflammation, it does so only when the inflammatory process has been arrested.

Under these circumstances, in the treatment of every wound, inflammation is always to be guarded against, and when present subdued, since it invariably acts as a disturbing influence in the process of repair.

These remarks apply as much to the healing of a wound by "quick union," or Hunter's "first intention," as to one which heals by the "process of granulation," or Hunter's "second intention," or to one by "scabbing," and I ought to add, to the restoration of any part that is undergoing repair, and which has been the seat of the inflammatory process. In support of this view I should like to quote the words of Karl Roser, of Marburg, an author who has well written upon this side of my subject, and who is likely to be listened to as a German professor :

"The clean not infected wound heals without inflammation by first intention; the infected wound, on the contrary, heals by second intention with the appearances of inflammation. In the first case healing follows immediately after the injury. In the other case inflammation intervenes between injury and healing as a disturbing complication" ('*Entzündung und Heilung*,' 1886, Leipzig).

These views of repair and the influence of inflammation on the reparative process which I have just formulated, and many of which I have taught for years ('*Practice of Surgery*'), are, I maintain, "Hunterian"; and if Hunter had enjoyed the opportunities we have had of learning the true cause of inflammation from the works of Pasteur and Lister, I have not a shadow of a doubt that he would have accepted the conclusions as they have been presented to you. How far he approached

our present views I will now proceed to demonstrate, and I shall do so, using his own words. As a leading quotation, I will select one which not only embodies the whole principle of subcutaneous surgery, of which Hunter was the distinguished founder, but shows that if Hunter had had an inkling of the true causes of inflammation how near to our present conclusions on repair and inflammation his would have been. Indeed, if we accept his sayings "that air will be injurious to man and animals by its containing specific particles of contagion," and "that any cause that can obstruct the motion of the blood in the smaller vessels for a certain time will irritate and produce inflammation," we might fairly infer that such knowledge of inflammation and its causes was not far off. At any rate, with the knowledge he possessed he came to the following conclusions.

"Mechanical injuries on sound parts," said Hunter, "may be divided into two heads: 1st, those which do *not* communicate externally with the air; and, 2nd, those which do. The effects of the first division—which do not communicate externally—on the constitution will differ according to the state of the constitution and the nature of the parts injured; if the power of healing in a part be strong, the part injured not vital, and the constitution not highly disposed to sympathy, *no material change* will take place in the constitution, and the process of restoration will go on with only local effects."

“ Wounds which do communicate externally with the air commonly both inflame and suppurate.”

“ The latter, when properly treated, may be brought back to a resemblance of the former, and so unite by primary healing or the first intention, by which inflammation and suppuration are prevented.”

“ Primary healing takes its course without inflammation and is painless.”

“ Wounds that are kept exposed do not granulate till inflammation is over.”

“ In simple fractures union will take place independent of inflammation.”

“ The absorption of blood when extravasated, and the healing beneath the scab, are both regarded as primary healing.”

In Hunter's recommendations as to the treatment of wounds the same general principles seem to be recognised, for he writes :

“ In the treatment of wounds, in order to facilitate the *natural process of healing*, little is to be done except removing impediments to the natural cure.” He saw with the eye of the physiologist what the eye of the poet dramatist had previously described :

“ Let Nature use her own maternal means,
And we await to second, not disturb her.”

With these apt quotations from Hunter's own writings and lectures, there can be no doubt as to his opinions :—That repair and inflammation are not only not analogous processes, but that they are

antagonistic ; although from his want of knowledge as to the true cause of inflammation he had mixed the two processes together, and consequently had failed to make his opinions clear.

It is to Hunter, therefore, more than to any man, that we are indebted for the recognition "*of Nature's resources in the cure of disease.*" "He saw," wrote one of our latest departed friends, Le Gros Clark, "that Nature was not to be regarded as an enemy to be combated, but as a friend with whom we may take counsel, and whose efforts it is our duty to watch and assist rather than to thwart and obstruct" (1875 Oration).

It is also owing to the information he laid before us in his great physiological doctrines of repair, that our present knowledge of the treatment of wounds by "rest" is unquestionably based.

"The first and great requisite for the restoration of the injured parts is rest, as it allows that action which is necessary for repair of injured parts to go on without interruption, and as injuries often excite more action than is required, rest becomes still more necessary."

"In sprains of joints," he said, "rest is the first principle."

"In diseases of joints rest cannot be too much insisted on."

"In the treatment of fractures the rest of the bone is the great object we have to aim at. The limb, if possible, should never be moved."

“A horizontal position, with temperance, should be the first thing advised in the cure of sore legs.”

Hunter saw also that rest from action is an element to appreciate even in disease, for he maintained “that everything in Nature that has power of action has two kinds of motion, exerted alternately, and a state of rest.”

He saw, however, further still, and said that “Life cannot go on always in the same state. It must have its stated seasons of rest and action. Hence, even in the most continued diseases, and when the cause is unvaried, there will be intervals of alleviation and exacerbation.”

“Nature,” he adds, “observing her general law, rests even in disease.”

These are the great principles of practice which John Hunter laid down for our guidance and the benefit of suffering humanity. They are so intimately associated with our own daily duties that it is well for us, perhaps, to be occasionally reminded as to whom we are indebted for them. The same remarks are likewise applicable to some other points of practice, for Hunter's acts were in many ways far in advance of his contemporaries. I have but time to bring a few of them before you.

In making a diagnosis of disease with the view of treatment, Hunter advised that the history of everything relative to the disease should be known,

as symptoms alone are often not enough to direct us. We should, therefore, get the history of it and of prior diseases, of peculiarities of constitution, manner of living, and even inquire into the temper and mind of the patient.

In his investigations and treatment of disease he must often have thought, if he had not expressed the thought in words, what has been well said by a modern thinker, my friend Dr. Pye-Smith, "That morbid processes are strictly physiological, and that the origin and condition of diseases and of death must be sought by the same methods as the origin and condition of health and life" (Lumleian Lecture, ii, 1892).

Hunter's remarks on hereditary dispositions are particularly good :

"It very rarely happens that a constitution is perfectly free from a tendency to some disease.

"The basis of diseases is frequently laid by accident, not by producing them immediately or naturally, but by exciting some susceptibility of the constitution, or of a part, into a disposition for a disease which may be latent."

"Disease is not hereditary, it is only the susceptibility which is so, the cause is necessary to bring it into action. It may," he adds, "be hereditary for a man to be irritable and passionate, but he will not go into a passion without some accidental cause."

"In some the susceptibility to a disease is very

strong; then it requires only a very slight cause to bring it into action."

"There must, however, always be an immediate cause to stimulate the susceptibility into action."

In the treatment of disease by stimulants he was very cautious. "Wine," he said, "does harm if it increases the action of the machine without giving strength, a thing carefully to be avoided. However, I have not yet made up my mind about wine."

"Wine," he adds in another place, "does harm in hectic cases, increasing circulation, calling up action without strengthening, but I am not quite determined on this point."

"I drink no wine myself, and seldom recommend it to others."

I hope the total abstainers will use this information with discretion!

"Women," he adds, "live a much more temperate life than men, which certainly must have considerable influence, both with regard to resisting and curing diseases."

In practical surgery many most important improvements must be attributed to Hunter. For his improved treatment of aneurysm enough has been said. Stanley stamped it "as the fairest of the fruits of Hunter's genius," and yet Hunter never wrote one line to recommend the operation. The first account of the operation was given by Home in a paper published in the first volume of the 'Transactions of the Society for the Improvement of

Medical and Chirurgical Knowledge,' published in 1793, and probably during Hunter's lifetime, but in 1786, a year after his operation, Hunter said: "In December, 1785, I performed the operation in a manner different from that usually practised, and with success. The particulars are found in the 'London Medical Journal.' I would only observe that in future I would advise only tying the artery in one part, and not to endeavour to unite the wound by the first intention."

For many others he has never had credit, and amongst them I must place his views upon the important question of operation for cancer. "I consider," said Hunter, "that the bad success arising from amputation of the breast for cancer arose from not taking away enough. I resolved to take away much more than seemed necessary. The surgeons round me thought that I did more than what was necessary."

"Perhaps it would be best always to remove the whole breast when there appears much disease, or even when the disease is not very extensive."

"Whenever a gland appears tumid or indurated in the neighbourhood of a cancer, the whole that appears diseased should be removed. *Unless the whole of the diseased part can be removed* the operation for cancer will avail but little. This always should be kept in view. An inattention to these circumstances has in my opinion brought the opera-

tion into disgrace, and caused people to suppose the disease to be a constitutional one."

Hunter evidently regarded cancer as a local disease, and advocated the practice, now generally adopted, of a free removal of the local tumour with the removal of all diseased glands.

Hunter advised "that varicose veins should be dissected out where this can conveniently be done;" and for the eradication of hydrophobia he said, "Mad dogs are chiefly in England. I really think that every dog here should be killed, and new ones bought, or that they should perform quarantine."

To conclude my references to Hunter's works I must refer to his observations on fossils, for they are greatly to his credit as a fearless thinker. Travers first brought the question fully before this College in his Oration for 1838, when he showed how Hunter had pointed out the evidence which fossils afford of the alteration of the condition of the earth's surface, as dry land submerged; and by frequent allusions to the many thousand years which must have elapsed while the earth was the theatre of these changes, he seems to have fully appreciated the necessity of an ample allowance of past time to account philosophically for the changes in question.

Mr. Clift, who transcribed Hunter's paper, told Mr. Travers that it was originally dictated, not "many thousand years," but "many thousand centuries," and he (Clift) has the copy of the letter

of the friend of Hunter (the late Major Rennell), who advised the change of expression in conformity with the popular notion of the world's age, and the religious prejudices of the period.

With these references to Hunter as a geologist, biologist, physiologist, pathologist, and surgeon I must bring my lecture to a close, and in doing so express a hope that we may continue in all gratitude to be inspired with the memory of John Hunter, and, as heretofore, periodically raise our voices in his honour, although it may be said with truth, that in the works of all who have followed his footsteps and studied in his spirit, he yet speaketh.

Let this Royal College of Surgeons of England, which placed a tablet over the grave of John Hunter in Westminster Abbey, continue to repeat the record there engraved of their admiration of his genius as a gifted interpreter of the Divine power and wisdom that works in the laws of organic life, and their grateful veneration for services to mankind as the father of scientific surgery.

The harvest which has already been reaped from the good seed which was sown by Hunter has been unrivalled, and the seed must be as fruitful in the future as in the past, if the fields are rightly tilled by his followers. Should, however, the seed be choked or hidden for a time by weeds which have been sown by either the promoters of a passing fashion, the advocates of some taking

and possibly erroneous theory, or of rank empiricism—Hunter's seed, if rightly nurtured, will spring up with renewed vigour, to enlighten those who seek light, for it possesses a germinal principle of life which guarantees vitality.





